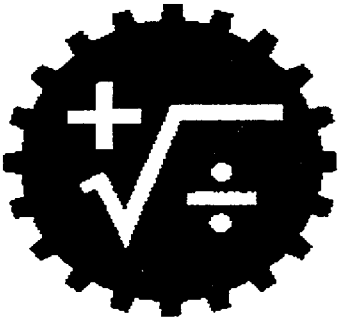
Assessment Annotations
for the Curriculum Frameworks

Mathematics

Grades 4, 8, and 10



Missouri Department of Elementary and Secondary Education
Robert E. Bartman, Commissioner of Education

MATHEMATICS- ASSESSMENT ANNOTATIONS

For The

Mathematics Curriculum Frameworks

The attached document provides supplemental assessment information to *Missouri's Framework for Curriculum Development in Mathematics K-12.* Contained within this assessment supplement are annotations that should be useful in understanding state and local responsibilities in assessing curriculum at the fourth, eighth, and tenth grade levels. This document indicates appropriate content and process specifications that should be useful in establishing curricula that prepares students to be proficient in mathematics.

Since the fourth and eighth grade benchmarks were established by the Framework's design, the column labeled, "What Students Should Know," establishes content that is appropriate for state testing. In addition, at the fourth, and eighth grade, the column labeled "What Students Should Be Able To Do" indicates appropriate processes for assessment. The last column labeled "Assessment Notes" further clarifies whether these processes are best assessed at the state or local level. If the phrase " Grade (4 or 8) state assessment" is shown'then this indicates that this process may be tested on the state mathematics examination at the indicated grade level.

Because benchmarks were not explicitly indicated at the tenth grade, the assessment notes provide information for both the "To Know" and "To Do" columns. The assessment notes indicate whether the content and processes are appropriate for assessment at the tenth grade on the state examination. Under the " Know" and "Do" categories in the assessment notes column, if the notation "Grade 10 state assessment" is indicated then this identifies content and processes that may be assessed at the state level. Under the " Do" of the assessment notes, process items are classified on whether these are assessed at the state level or better assessed at the local level. The notation "Beyond 10th grade state assessment" indicates material that students may or may not have covered at this point and therefore is not tested at the state level.

All of the benchmarks that were identified by the notation, "Grade (4, 8, or 10) state assessment," will not necessarily appear on a state test in any given year. The number of test items developed to access mathematical content and processes may vary from year-to-year. Only Framework pages that required assessment notes are provided within this document which results in the skipping of some page numbers.

IX. Mathematical Systems and Number Theory

What All Students Should Know

By the end of grade 4, all students should know

1. Basic operations of addition, subtraction, multiplication **and** division are related to each other.

2. The concepts of factors and multiples in relation to multiplication and division.

What All Students Should Be Able To Do

NOTE: Each item in this column is designed to address several elements of "what all students should be able to do."

By the end of grade 4, all students should be able to

a. develop the "need" for whole numbers, integers and rational numbers, including fractions and decimals by looking for patterns and relationships to solve problems (NCTM Standard 6; MO 1.6, 3.2, 3,3)

b. develop and use number operations and order relations for decimals (money) (NCTM Standard 6; MO 1.6, 3.2, 3.3)

c. develop an understanding of how basic arithmetic operations are related to one another (NCTM Standard 6; MO 1.6)

d. develop and use number theory concepts, including factors and multiples in problem solving (NCTM Standard 6; MO 1.6, 3.5)

e. model, develop, and explain basic facts and algorithms with reasonable proficiency (NCTM Standard 8; MO 3.6)

Fourth Grade **Assessment Notes**

Do

a. Grade 4 state assessment

b. Grade 4 state assessment

c. Grade 4 state assessment

d. Grade 4 state assessment

e. Grade 4 state assessment

IX. Mathematical Systems and Number Theory

What All Students Should Know

By the end of grade 8, all students should now

a. Commutative, associative, and distributive properties.

b. Properties of zero and one.

c. Patterns may be used to describe relationships for multiples, factors, and exponents.

d. Order of operations.

What All Students Should Be Able To Do

NOTE: Each item in this **column is designed to address several elements of "what all students should be able to do."**

By the *end of grade* 8, *all students should be able to*

a. evaluate the need and applications of numbers not contained in the set of whole number (NCTM Standard 6; MO 1.1, 3.2, 3.3, 4.1)

b. develop an understanding of and explain order and relationship among integers, fractions, and decimals (NCTM Standard 6; MO 1.6, 2.2)

c. use real-world and mathematical problem situations to develop and apply number theory concepts (such as primes, factors, and multiples) (NCTM Standard 6; MO 1.6, 1.10, 3.2, 3.3)

d. realize the dynamic nature of mathematics and how different mathematical systems apply to current and developing real-world situations (NCTM Standard 6; MO 1.10, 2.5, 4.5, 4.8)

e. apply commutative, associative, and distributive relationships in computation and estimation situations. (NCTM Standard 6; MO 1.6; 3.2, 3.3)

f. recognize the connection of irrational numbers and the real world. (NCTM Standard 6; MO 1.6, 3.2, 3.3)

Eighth Grade Assessment Notes

Do

a. Grade 8 state assessment

b. Grade 8 state assessment

c. Grade 8 state assessment

d. Grade 8 state assessment

e. Grade 8 state assessment

f. Grade 8 state assessment

IX. Mathematical Systems and Number Theory

What All Students Should Know

By *the end of grade 12, all students should know*

1. Properties of real numbers.
2. Procedures for calculator and/or computer use.
3. Basic algebraic procedures.
4. Geometric relationships.

What All Students Should Be Able To Do

NOTE Each item in this column is designed to addmss several elements of "what all students should be able to do."

By the end of grade 12, all students should be able to

a. compare and contrast the real number system and its various subsystems (NCTM Standard 14; MO 2.1, 4.1)

b. select and apply appropriate technology as a problem-solving tool to achieve understanding of the logic of algebraic and geometric procedures (NCTM Standard 14; MO 1.4, 3.6)

c. investigate and determine similarities and differences between mathematical systems (NCTM Standard 14; MO 2.1, 4.1, 4.6)

d. extend understanding and application of number theory concepts (NCTM Standard 6; MO 1.6, 3.2, 3.3)

Tenth Grade Assessment Notes

Know	Do
1. Grade 10 state assessment	a. Grade 10 state assessment
2. Grade 10 state assessment	b. Grade 10 state assessment
3. Grade 10 state assessment	c. Grade 10 state assessment
4. Grade 10 state assessment	d. Grade 10 state assessment